CHAPTER 5
TARGET AND SIMULATION EQUIPMENT EMPLACEMENTS

5-1. INFANTRY TARGET AND SIMULATION EQUIPMENT INSTALLATION.

a. General Requirements.

(1) Permanent Emplacement Requirements. Infantry target devices must be installed in permanent emplacements (drawings C-01 through C-06, appendix F). Each emplacement may be constructed with reinforced concrete of either cast-in-place or precast sections. When concrete is used, treated timbers or railroad ties must be positioned as shown on the drawings in order to protect the top of the emplacement walls from direct fire or crossfire.

(2) Drainage Requirements. To facilitate emplacement drainage, the emplacement must be sloped at least 2 percent, draining to the back of the emplacement. In addition, the emplacements must have a 150-millimeter-thick (6-inch-thick) granular drainage layer (drawings C-01 through C-06, appendix F). The drainage layer also must slope a minimum of 2 percent. Positive drainage of the target emplacements must be provided; therefore, special drainage provisions for each specific site must be determined by the designer.

(3) Slopes and Underground Requirements. Emplacements positioned on ascending slopes or underground must have a detached rear retaining wall constructed of antiricochet materials such as treated timbers or railroad ties. (See drawings C-01 through C-06, appendix F, for a typical design.) Grade transition walls required for slope stabilization and erosion control will also be constructed of materials similar to those used in the rear retaining walls and deployed as determined by the designer.

(4) Wall Height Requirements. The wall heights identified in the tables on drawings C-01, C-02, C-04, and C-05, appendix F, and the emplacement side-wall taper identified in those drawings are based on the angle of fire. The angle of fire is defined as the angle (measured from the horizontal) created by the difference in elevation between the firing point and the top of the emplacement wall. The angle of fire is used to determine the wall height needed to protect the target mechanism and is of concern only when the target is at a lower elevation than the firing point. When the target is at a higher elevation than the firing point, the minimum wall height is applicable.

b. IMT Emplacement.

(1) The IMT emplacement must be positioned 45 degrees, ±5 degrees, to the engagement point, with the CJB located at the end of the emplacement closest to the engagement point (drawing C-05 and C-06, appendix F). The emplacement will contain the target mechanism, CJB, and IMTC. The IMTC mounting surface must be level in the direction of target travel to within ±1/2 degree.

(2) As part of the site-adaptation process, the target carrier may need to be elevated in order to minimize the effects of ice, snow, sand, and/or drainage on the operation of the target system. Then the required front wall heights shown in the table on drawing C-05, appendix F, should also be increased by the same height as the track in order to maintain the proper degree of protection.

c. SIT Emplacement.

(1) Basically, the SIT emplacement consists of one front wall and two side walls. The protective wall height measured from where the target mechanism is mounted to the top of the wall is the height given in the table on drawing C-01 through C-03, appendix F. The emplacement design in drawing C-01, appendix F, has a rectangular configuration and provides for a base slab on which the target mechanism stands. The emplacement can accommodate double- or single-silhouette targets.

(2) A suggested SIT emplacement design is presented in drawing C-01, appendix F. That design is the standard design and has been approved by the equipment installation contractor. To ensure that the targetry equipment can be installed and will be adequately protected, any deviations from that design must be coordinated with the targetry equipment supplier.

(3) Each SIT emplacement must contain a target mechanism and CJB, and each emplacement must also have an electrical blockout (drawing C-01, appendix F). In addition, NMFS's may be mounted on the emplacements.

d. SIT/IHFS Emplacement. A combination SIT/IHFS emplacement is presented in drawing C-04, appendix F. The IHFS and cable will be furnished by the RETS equipment supplier.

5-2. ARMOR TARGET INSTALLATION.

a. SAT Emplacement. The THMTG is the movement mechanism for the SAT. The THMTG will be installed on a concrete pad and protected from direct fire and crossfire by berms or trenches in accordance with chapter 6. A typical berm section is shown in drawing C-08, appendix F. The designer must site adapt the placement of targets, ensuring proper target mechanism protection (chapter 6).

b. AMTC Emplacement.

(1) Each AMTC track will be approximately 350 meters long and should be oriented approximately 45 degrees to the engagement point. See drawings C-08, C-9, and C-10, appendix F, for a suggested AMTC emplacement design. See paragraph 5-4 below for AMTC roadbed parameters.

(2) The AMTC must be protected by berms or trenches from direct fire or crossfire. The protective structure must be high enough to protect the target mechanism without obscuring any targets. (See chapter 6 for target protection design.) When a retaining wall is part of the protection, the wall must be checked for stability and structural adequacy for the particular site characteristics. Drawing S-14, appendix F, shows a suggested design.

5-3. AMTC STORAGE BUILDING (OPTIONAL).

a. Purpose. A building or lean-to for storage of the idle armor moving target assembly, target spare parts, and downrange power panels is an option to be considered by the using agency.

b. Siting and Design. The building or lean-to, if needed, will be located at the end of the track system closest to the engagement point. The design agency will design the building or lean-to according to the physical and security requirements of the using agency. Drawings A-20 and S-11 through S-13 show a suggested design. The designer must provide sufficient space for equipment so that the contractor can install the AMTC system components. (See drawing E-10 for the approximate location and space requirements of the electrical equipment.)

c. Floor. If the building or lean-to is used, the floor of the structure may be either reinforced concrete slab or ballast. If a slab is used, a cutout area for the track system must be provided so that the roadbed can be constructed in accordance with paragraph 5-4 below.

d. Rails. Regardless of the flooring system used, the top of the rail elevation must be coordinated with the design of the building or lean-to so that the rail will not interfere with the operation of the doors.

5-4. AMTC ROADBED DESIGN PARAMETERS.

a. General Requirements. Basically, the roadbed for the AMTC consists of (1) a prepared subgrade that may include a filter layer, (2) a ballast section, and (3) the track system. The range construction contractor will be responsible for preparing the subgrade and providing enough ballast to construct the track bed, plus 10-percent extra material. The range construction contractor will only be responsible for installing the ballast at the bunker end of the track for a distance of 19.8 meters (65 feet) and for providing a wall height above the subgrade that will protect the target mechanism. The targetry equipment contractor will be responsible for placing the remaining ballast, providing and installing the wood ties, and providing and attaching the rails to the wood ties. See figure 5-1 for a typical roadbed section and figure 5-2 for a typical transition between the powered and unpowered sections of the track system.

b. Roadbed Section. The roadbed section and the materials used in its construction have been designated as a design interface. A typical section of the AMTC roadbed is shown in figure 5-1. The portions of the roadbed that are of concern to the range construction contractor are described below.

(1) Subgrade. The top 300 millimeters (12 inches) of the subgrade should be compacted as specified in ASTM D1557, Method D. The subgrade should be compacted to 90-percent laboratory maximum dry density for cohesive soils and to 95-percent laboratory maximum dry density for cohesionless soils. As shown in figure 5-1, the top of the subgrade should be sloped toward the back of the emplacement away from the protective wall in order to facilitate drainage. In addition, the top of the subgrade at the protective wall must be a minimum of 1.52 meters (60 inches) below the top of the retaining wall for tank gunnery, 1.83 meters (72 inches) for aerial gunnery.

(2) Filter Layer. Depending upon the type of subgrade and the location of the range, a subballast or filter layer may be required between the ballast and the subgrade. The need for a filter layer should be determined as part of the site-adaptation process. The top of any filter layer should be located a minimum of 1.52 meters (60 inches) below the top of the retaining wall for tank gunnery and 1.83 meters (72 inches) for aerial gunnery, since the ballast layer does not include the thickness of additional required filter layers (see figure 5-1). The placement of the filter material will be the responsibility of the range construction contractor.

(3) Ballast.

(a) AREA Requirements. Ballast material will consist of crushed stone conforming to AREA Manual for Railway Engineering size No. 57. The range construction contractor will be responsible for ensuring that the ballast material conforms to AREA requirements.

(b) Stockpiling. The construction contractor will also stockpile sufficient ballast at each emplacement for roadbed construction, plus 10-percent extra material. To calculate the exact quantity of ballast required for stockpiling at each AMTC track bed, the construction contractor will determine the ballasts maximum density (kilograms per cubic meter) and apply that density to the volume required to construct a typical section. The contractor will then divide the required quantity into two equal piles and place one pile at the end of each AMTC track bed location. The stockpiled ballast will be easily accessible, but not in the way of the targetry contractor. Stockpile locations must be approved by the targetry contractor.

(c) Amount for Normal Elevations. Approximately 450 cubic meters (588 cubic yards) of ballast material (which includes the 10-percent extra material) will be required for a 350 meter-long (1,150-foot-long) track designed as shown in figure 5-1. (The 450 cubic meters (588 cubic yards) would be for a minimum of 125 millimeters (5 inches) of ballast under the ties.)

(d) Amount for Superelevations. When the AMTC has curves with radii of 152 to 427 meters (500 to 1,400 feet), additional ballast will be necessary in order to provide the required superelevation. For example, a 152-meter-radius (500-foot-radius) curve will require approximately .025 cubic meters (1 cubic yard) additional ballast per linear meter (foot) of curve for a superelevation of 75 millimeters (3 inches).

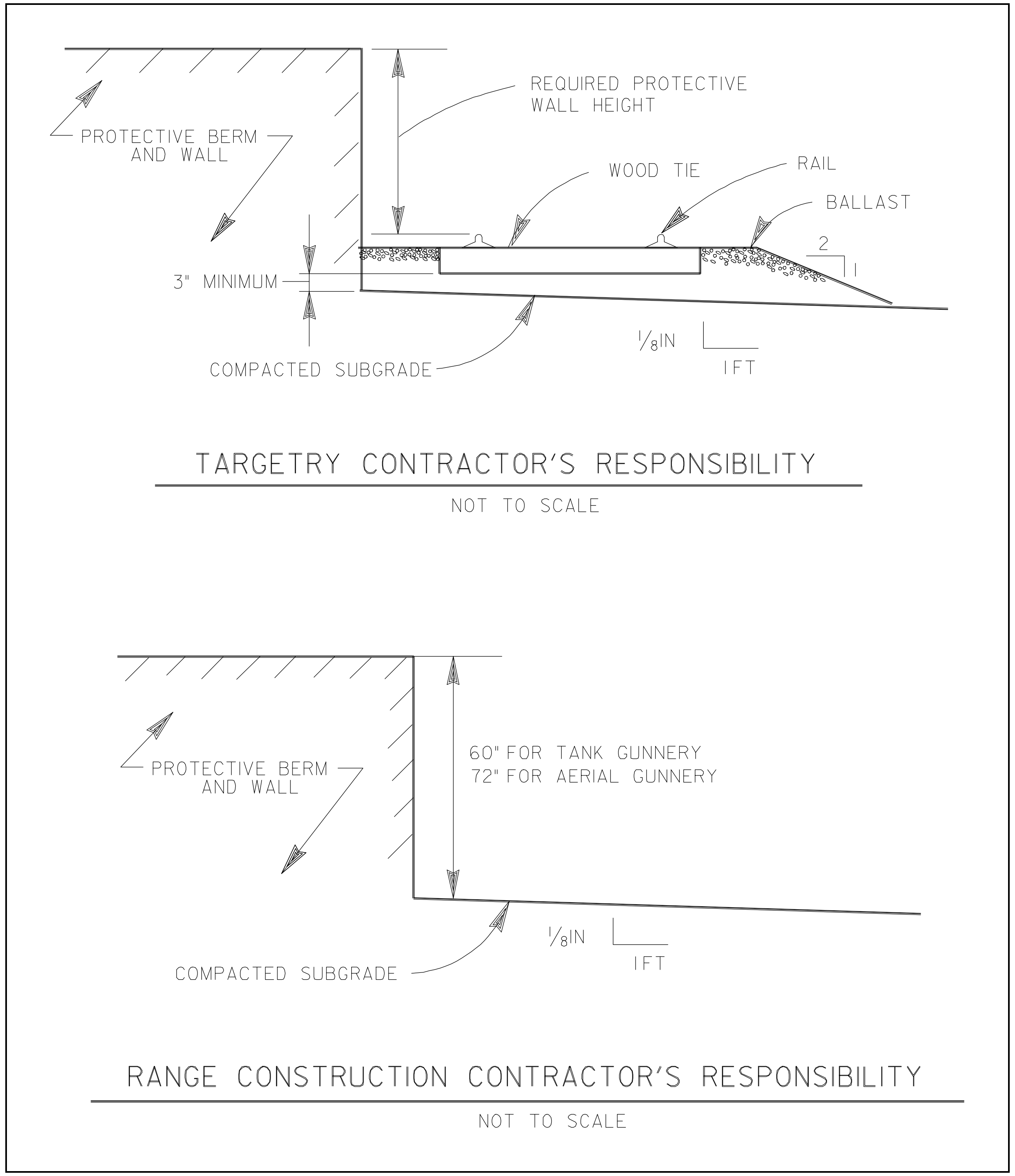

Figure 5-1. Typical section of AMTC roadbed

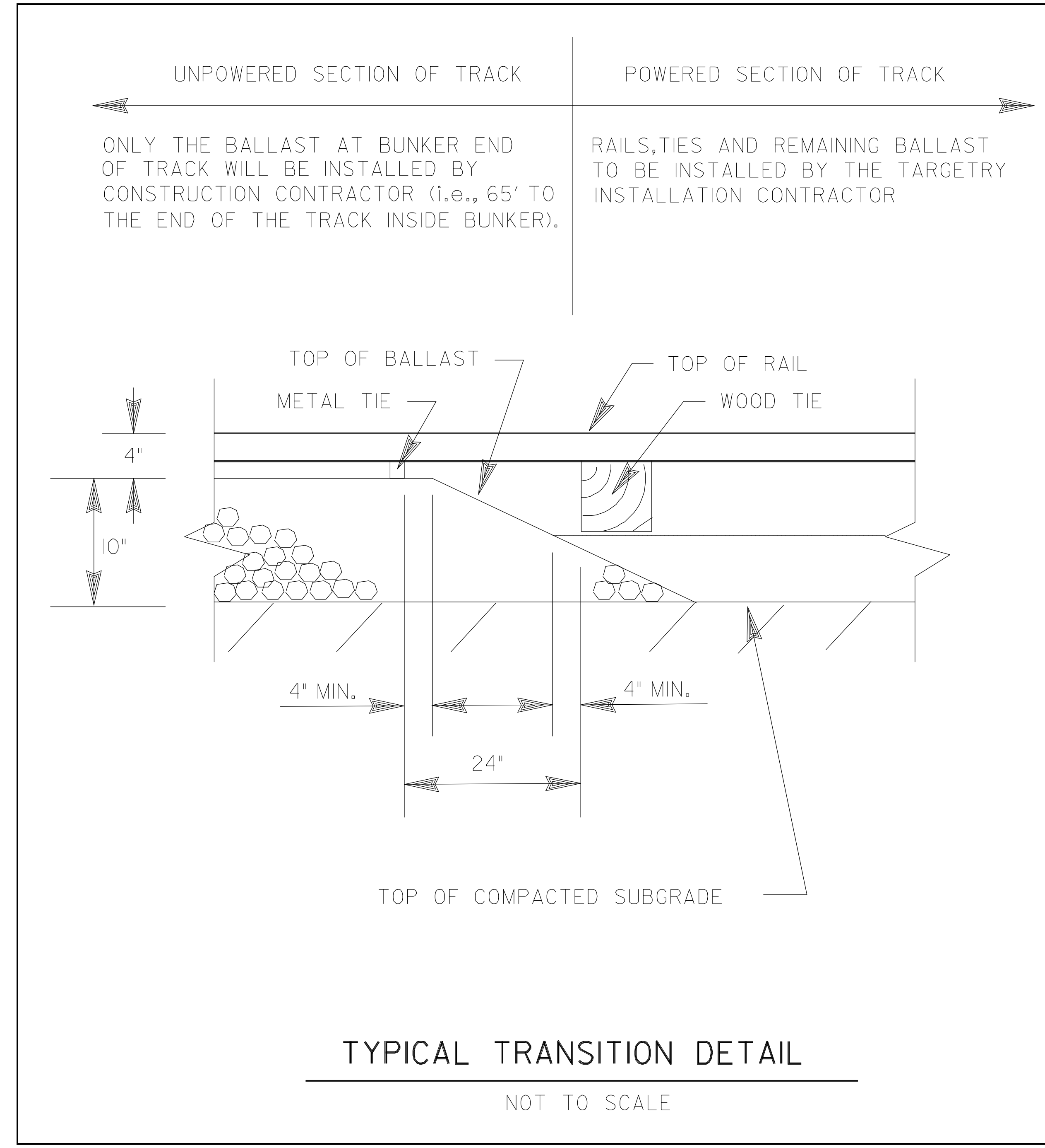

Figure 5-2. Typical transition between powered and unpowered section of track system

c. Track System

(1) Design Parameters.

(a) The total track length provided with the AMTC emplacement is 350 meters (or about 1,150 feet).

(b) The ballast roadbed and track section must continue to within 1.5 meters (5 feet) of the back wall if the optional storage building is used.

(c) The retaining wall for the AMTC will be designed using site-specific design parameters.

(2) Track Alignment

(a) The minimum turning radius must be 152 meters (500 feet).

(b) The maximum grade of the track must be 10 percent.

(c) The unpowered section of track must be straight, with a slope of zero, ±1 percent.

(d) The last 40 meters (131 feet) at each end of the powered section of track must have a slope of zero, ±1 percent.